

Date: Tuesday, 06/05/2008 3:48:34 PM  
 User: Julie Lecocq

## Process Sheet

|                                    |  |                           |                                 |
|------------------------------------|--|---------------------------|---------------------------------|
| <b>Customer</b> :                  | CU-DAR001 Dart Helicopters Services  | <b>Drawing Name</b> :     | 412 X-TUBE INST, LOW NARROW AFT |
| <b>Job Number</b> :                | 39073  |                           |                                 |
| <b>Estimate Number</b> :           | 13211  |                           |                                 |
| <b>P.O. Number</b> :               |  | <b>Part Number</b> :      | D412664205TRN                   |
| <b>This Issue</b> :                | 06/05/2008   | <b>Drawing Number</b> :   | D412-664 -245 REV C             |
| <b>Prsht Rev.</b> :                | NC   | <b>Project Number</b> :   | N/A                             |
| <b>First Issue</b> :               | ///  | <b>Drawing Revision</b> : | C                               |
| <b>Previous Run</b> :              | 39072  | <b>Material</b> :         |                                 |
| <b>Written By</b> :                |  | <b>Due Date</b> :         | 13/05/2008                      |
| <b>Checked &amp; Approved By</b> : | JUD 08.5.08  |                           |                                 |
| <b>Comment</b> :                   | Est Rev: A New Issue 08-03-06 DD verified by: ec<br>Est Rev B 08.04.02 Removed polish EC verified by: DD |                           |                                 |

## Additional Product

Job Number:



|                |                              |                      |
|----------------|------------------------------|----------------------|
| <b>Seq. #:</b> | <b>Machine Or Operation:</b> | <b>Description :</b> |
|----------------|------------------------------|----------------------|

|     |          |                    |
|-----|----------|--------------------|
| 1.0 | D6009129 | Crosstube Material |
|-----|----------|--------------------|



**Comment:** Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6009-129 Crosstube 332306

Check OD = 3.500"; ID = 2.250"

a.m 08.06.25 ①

|     |            |                            |
|-----|------------|----------------------------|
| 2.0 | MORI SEIKI | MORI SEIKI CNC LATHE LARGE |
|-----|------------|----------------------------|

**Comment:** MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand &amp; install plugs DT8534 on both ends as per Folio FA690

2-Turn first side as per Folio FA690

3- File transition lines smooth.

a.m 08.06.26 ①

|     |     |                              |
|-----|-----|------------------------------|
| 3.0 | QC1 | INSPECT ALL DIM TO DIM SHEET |
|-----|-----|------------------------------|

**Comment:** INSPECT ALL DIM TO DIM SHEET

a.m 08.06.26 ①

|     |            |                            |
|-----|------------|----------------------------|
| 4.0 | MORI SEIKI | MORI SEIKI CNC LATHE LARGE |
|-----|------------|----------------------------|

**Comment:** MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA690

2- File transition lines smooth.

3- Remove sand and plugs

a.m 08.06.26 ①

**Dart Aerospace Ltd**

| W/O: |      | WORK ORDER CHANGES |    |      |     |                                     |                          |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE   | By | Date | Qty | Approval<br>Chief Eng /<br>Prod Mgr | Approval<br>QC Inspector |
|      |      |                    |    |      |     |                                     |                          |
|      |      |                    |    |      |     |                                     |                          |

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

| NCR: |      | WORK ORDER NON-CONFORMANCE (NCR) |                             |                                 |                |                           |                       |                          |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC<br>Section A   | Corrective Action Section B |                                 |                | Verification<br>Section C | Approval<br>Chief Eng | Approval<br>QC Inspector |
|      |      |                                  | Initial<br>Chief Eng        | Action Description<br>Chief Eng | Sign &<br>Date |                           |                       |                          |
|      |      |                                  |                             |                                 |                |                           |                       |                          |
|      |      |                                  |                             |                                 |                |                           |                       |                          |
|      |      |                                  |                             |                                 |                |                           |                       |                          |

**NOTE:** Date & initial all entries

Date: Tuesday, 06/05/2008 3:48:34 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 412 X-TUBE INST, LOW NARROW AFT

Job Number: 39073

Part Number: D412664205TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

4-Scribe part # and batch # using vibrating stylus as per Dwg D412-664-245  
engrave on outside of tube)

Inside of Cuff(Donot

*Q.m 08.06.26 ②*

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

*a.m 08.06.26 ①*

6.0

QC8

SECOND CHECK



Comment: SECOND CHECK

*AWM  
8-6-27*

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

*AWM  
8-6-27*

8.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

*Q.m 08.06.27 ①*

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Identify and stock in kanban rack

Location:

*L-6 X TUBES 8-6-27*

10.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

*08/07/019A*

Job Completion



*UMF 08-06-27*

**Dart Aerospace Ltd**

| W/O: |      | WORK ORDER CHANGES |    |      |     |                                     |                          |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE   | By | Date | Qty | Approval<br>Chief Eng /<br>Prod Mgr | Approval<br>QC Inspector |
|      |      |                    |    |      |     |                                     |                          |
|      |      |                    |    |      |     |                                     |                          |

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

| NCR: |      | WORK ORDER NON-CONFORMANCE (NCR) |                             |                                 |                |                           |                       |                          |
|------|------|----------------------------------|-----------------------------|---------------------------------|----------------|---------------------------|-----------------------|--------------------------|
| DATE | STEP | Description of NC<br>Section A   | Corrective Action Section B |                                 |                | Verification<br>Section C | Approval<br>Chief Eng | Approval<br>QC Inspector |
|      |      |                                  | Initial<br>Chief Eng        | Action Description<br>Chief Eng | Sign &<br>Date |                           |                       |                          |
|      |      |                                  |                             |                                 |                |                           |                       |                          |
|      |      |                                  |                             |                                 |                |                           |                       |                          |
|      |      |                                  |                             |                                 |                |                           |                       |                          |

**NOTE:** Date & initial all entries

**DART**

|                            |                             |  |                        |
|----------------------------|-----------------------------|--|------------------------|
| DESIGN <i>QD</i>           | DRAWN BY <i>QD</i>          | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA |                        |
| CHECKED <i>[Signature]</i> | APPROVED <i>[Signature]</i> | DRAWING NO.<br>D412-664-245                              | REV. C<br>SHEET 1 OF 3 |
| DATE<br>07.03.29           |                             | TITLE<br>CROSSTUBE ASS'Y (412 LOW-N AFT) NTS             |                        |
| A                          | 06.12.01                    | NEW ISSUE  |                        |
| B                          | 07.03.01                    | CHG CUFF AREA, CHG RUBBER CUSHION                        |                        |
| C                          | 07.03.29                    | CHG RIVET AND RUBBER CUSHION                             |                        |

**RELEASED**07.04.24 *[Signature]***PARTS LIST:**

| Qty | Part Number       | Description   |
|-----|-------------------|---|
| X   | D412-664-245      | CROSSTUBE ASSEMBLY (412 LOW-NARROW AFT)   |
| 1   | D6009-129         | CROSSTUBE   |
| 2   | D2856-600-1009    | ABRASION STRIP  |
| 1   | D2896-1           | SUPPORT   |
| 2   | D3189-1           | CHAFING SHIELD  |
| 2   | D3595-063-570     | RUBBER CUSHION  |
| 2   | D3606-1           | CUFF  |
| 44  | CR3212-4-07       | RIVET (OR M7885/3-4-07)   |
| 4   | MS21920-28        | CLAMP   |
| 2   | MS21920-30        | CLAMP (OR MS21920-32)   |
| A/R | MAGNOBOND 6398    | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE) |
| A/R | SIKAFLEX-241/-291 | SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)   |

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH = 123.59±0.020 (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 14) INSTALL D3606-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 15) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY

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ENGINEERING

UNCONTROLLED COPY

SUBJECT TO AMENDMENT

WITHOUT NOTICE

WORK ORDER

39073

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RELEASED

07.04.24

22.0"  
(560mm)  
ALONG BE

STRIP (1)

INSTALLED OVER ABRASION STRIP)

9

13

6

11.8", 10%  
CRUSHING OK

15.19"  
(386mm)

R30

14.90  
(REF)

16.82  
 $\pm 0.13$

18.39  
 $\pm 0.13$

24.48  
(REF)

TRIM TO DIMEN

SHOP COPY  
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ENGINEERING  
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SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 39073

SECTION C-C  
SCALE 1:2

3.075

2.500 $\pm 0.005$

1.700

0.800

0.450 $\pm 0.010$   
 $-0.035$

45°  
(TYP)

8

BOND  
AND  
STUBE

96-1  
PORT  
(REF)

570  
HION  
(REF)

21920-30  
AMP (REF)

13

IN BY

AP

DART

DART AEROSPACE LTD.  
HAWKESBURY, ONTARIO, CANADA

OVED

AP

DRAWING NO.  
D412-664-245

REV. C

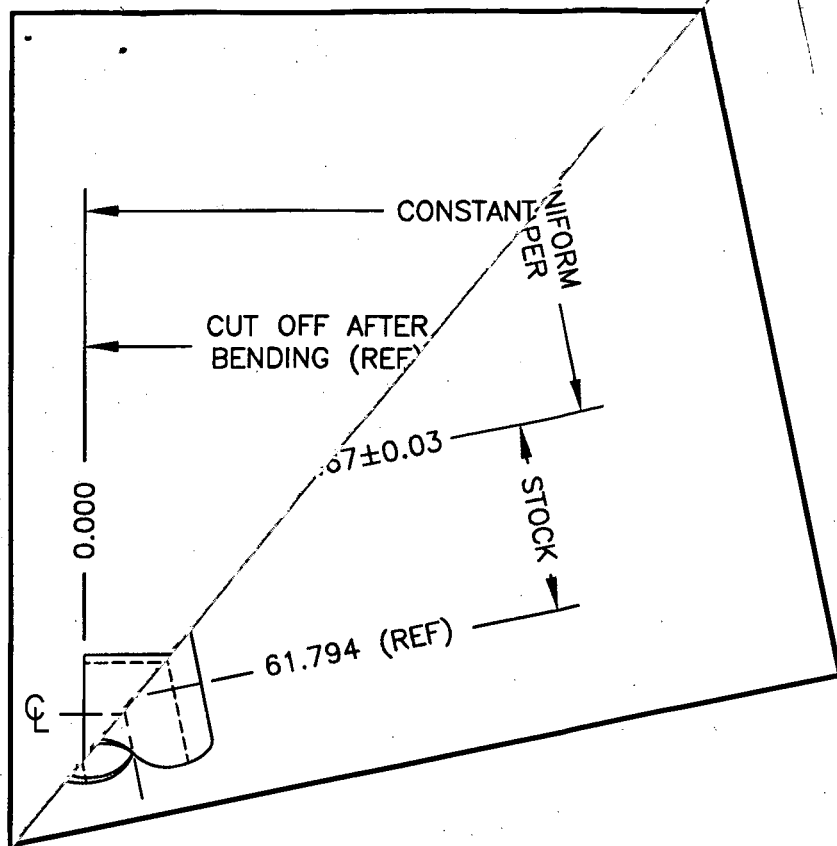
SHEET 2 OF 3

TITLE

CROSSTUBE (412 LOW-NARROW AFT)

SCALE

1:8







|                    |        |                           |
|--------------------|--------|---------------------------|
| DART AEROSPACE LTD |        | Work Order: B 39073       |
| Description:       |        | Part Number: 0412-664-245 |
| Inspection Dwg:    | Rev: C | Page 1 of 1               |

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

| Drawing Dimension | Tolerance                      | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|-------------------|--------------------------------|------------------|--------|--------|----------------------|----------|
| 49.760            | + .005 <sup>3.256</sup> - .000 | 3.261            | /      |        |                      |          |
| 46.280            | + .005 <sup>3.256</sup> - .000 | 3.261            | /      |        |                      |          |
| 41.000            | + .005 <sup>3.134</sup> - .000 | 3.139            | /      |        |                      |          |
| 35.000            | + .005 <sup>2.994</sup> - .000 | 2.999            | /      |        |                      |          |
| 29.000            | + .005 <sup>2.855</sup> - .000 | 2.900            | /      |        |                      |          |
| 23.470            | + .005 <sup>2.726</sup> - .000 | 2.731            | /      |        |                      |          |
| 17.980            | + .005 <sup>2.612</sup> - .000 | 2.617            | /      |        |                      |          |
| 13.950            | + .005 <sup>2.612</sup> - .000 | 2.617            | /      |        |                      |          |
| 10.000            | + .005 <sup>2.612</sup> - .000 | 2.617            | /      |        |                      |          |
|                   |                                |                  |        |        |                      |          |
|                   |                                |                  |        |        |                      |          |
|                   |                                |                  |        |        |                      |          |
| 49.760            | + .005 <sup>3.256</sup> - .000 | 3.261            | /      |        |                      |          |
| 46.280            | + .005 <sup>3.256</sup> - .000 | 3.261            | /      |        |                      |          |
| 41.000            | + .005 <sup>3.134</sup> - .000 | 3.139            | /      |        |                      |          |
| 35.000            | + .005 <sup>2.994</sup> - .000 | 2.999            | /      |        |                      |          |
| 29.000            | + .005 <sup>2.855</sup> - .000 | 2.900            | /      |        |                      |          |
| 23.470            | + .005 <sup>2.726</sup> - .000 | 2.731            | /      |        |                      |          |
| 17.980            | + .005 <sup>2.612</sup> - .000 | 2.617            | /      |        |                      |          |
| 13.950            | + .005 <sup>2.612</sup> - .000 | 2.617            | /      |        |                      |          |
| 10.000            | + .005 <sup>2.612</sup> - .000 | 2.617            | /      |        |                      |          |
|                   |                                |                  |        |        |                      |          |
| 123.890           | + .0020                        | 123.600          | /      |        |                      |          |

|                  |                 |                         |
|------------------|-----------------|-------------------------|
| Measured by: Q.M | Audited by: AWM | Prototype Approval: N/A |
| Date: 08.06.26   | Date: 8-6-27    | Date:                   |

| Rev | Date | Change    | Revised by | Approved |
|-----|------|-----------|------------|----------|
| A   |      | New Issue | KJ/JLM     |          |